

AD-A032 276

WASHINGTON UNIV SEATTLE DEPT OF PSYCHOLOGY

F/G 5/10

EXPECTANCY AND EXPECTED VALUE: DECISION MODELS FOR ORGANIZATION--ETC(U)

N00014-67-A-0103-0032

UNCLASSIFIED

NL

JAN 76 T R MITCHELL

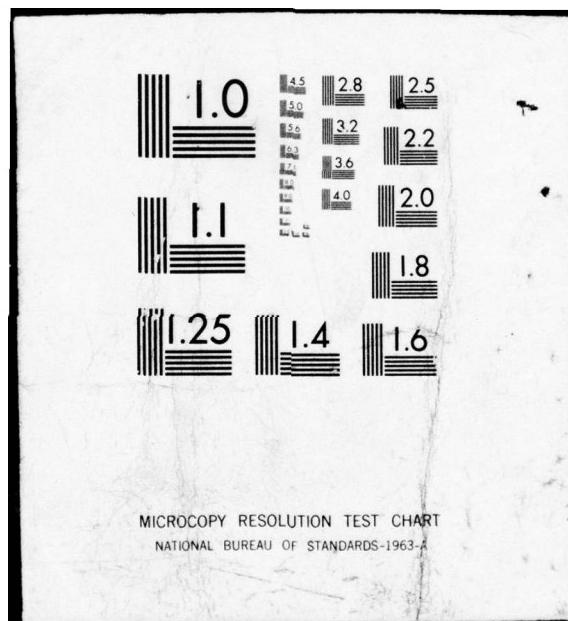
TR-75-77

| OF |  
AD  
A032 276



END

DATE  
FILMED  
1-77



Final Report

Contract N00014-67-A-0103-0032

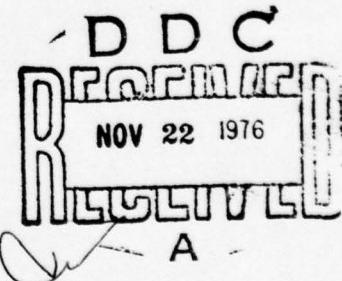
Agency: Organizational Effectiveness Research Programs  
Office of Naval Research

Period of Contract: 1 June 1973 to 31 December 1975

ADA032276

From: Terence R. Mitchell, Principal Investigator  
University of Washington  
Department of Management and Organization  
Seattle, Washington

Reporting Date: 1 January 1976



DISTRIBUTION STATEMENT A  
Approved for public release;  
Distribution Unlimited

## UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER <b>TR-75-77</b>	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) EXPECTANCY AND EXPECTED VALUE: DECISION MODELS FOR ORGANIZATIONS.		5. TYPE OF REPORT & PERIOD COVERED Final Report - June 1, 1973 - December 31, 1975
6. PERFORMING ORG. REPORT NUMBER 20-2740 <i>not used dep mos.</i>		7. AUTHOR(s) <b>Terence R. Mitchell</b>
8. CONTRACT OR GRANT NUMBER <b>N00014-67-A-0103-0032</b>		9. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR 170-761
10. PERFORMING ORGANIZATION NAME AND ADDRESS Organizational Research Department of Psychology NI-25 University of Washington, Seattle, WA 98195		11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research, Code 452 800 North Quincy Street Arlington, VA 22217
12. REPORT DATE <b>1 January 1, 1976</b>		13. NUMBER OF PAGES 42
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) <b>Final rept. 1 Jun 73 - 31 Dec 75</b>		15. SECURITY CLASS. (of this report) UNCLASSIFIED
16. DISTRIBUTION STATEMENT (of this Report) <b>12 H48P.</b>		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) <b>DISTRIBUTION STATEMENT A Approved for public release; Distribution Unlimited</b>		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Expectancy, Expected Value, Decision Models, Organizational Behavior, Subjective Expected Utilities, Social Power, Situational Factors, Valence, Behavioral Choice Model, Job Effort Model, Leadership, Contingency Factors, Directive, Supportive, Achievement Oriented, Participative		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The development of Expectancy Theory and Expected Value models is reviewed. The research supporting these models in the areas of decision making, leadership attitudes, motivation and social power is discussed. The final section provides insights into the application of these models for questions of organizational design.		

**387783**

AB

Expectancy and Expected Value: Decision Models for Organizations

Terence R. Mitchell

University of Washington<sup>1</sup>

At the moment there appears to be a fairly common theme running through much of the behavioral sciences. Scheibe (1970) states it as "What a person does (his behavior) depends upon what he wants (his values) and what he considers to be true or likely (his beliefs) about himself and the world (his psychological society)" (p. 1). That is, the voluntary choices that people make are predictable from the likelihood that various consequences will occur and the value of these consequences. People should choose those actions that result in the greatest benefit.

But to examine all behavior as a function of these psychological processes may be too simplistic. It is important that we understand a number of related ideas. First, a given behavior is undoubtedly based upon more than one belief or value. We would like to understand how different beliefs and values combine with one another in order to predict what one will actually do.

Second, it is to some extent begging the question to say everything we do is based on beliefs and values. That is, to understand behavior, we must understand how values and beliefs are formed, developed, and changed. For both of the above reasons we must learn more about the individual's psychological reality. His beliefs and values are shaped by his past experience and by the way he views his surroundings.

Finally, it is clear that an individual's beliefs and values change from time to time and from place to place. The physical reality of the surrounding environment helps to determine what beliefs and values may be operating at a given time. This orientation results in the familiar sayings

in psychology, "behavior is a function of the person and the environment" or "the individual is a product of heredity and the environment."

With these considerations in mind, we can theorize that the causes of most of voluntary behavior are beliefs and values. For the rest of the paper, we will discuss a number of models constructed from beliefs and values as well as the empirical support for these models in predicting behavior relevant for organizational settings. The implications for organizational design will be summarized at the end of the paper.

### Historical Perspective

The components of thought which we have labeled beliefs and values are prevalent in numerous other contexts and have been with us for a long time.

One can begin with an analysis of the writings of Plato who suggested that man's soul was composed of three parts: Knowing, wanting, and willing.

While the philosophical issues discussed by Plato may have been somewhat different from our purposes, the critical point is that beliefs as knowledge and values as wanting were seen as distinctly separate conceptual units.

The questions of "What is true?" as opposed to "What is best?" still challenge us today.

If one traces the philosophical development of these ideas we can see that whole schools of thought revolve around these concepts. The field of epistemology is concerned with how people arrive at knowing one thing or another. Ethics, on the other hand, is concerned with questions of value.

In psychology, numerous investigators have differed in terms of the emphasis placed on beliefs and values. Early in the 20th Century, the work of John D. Watson and behaviorists that followed, advocated a psychology

devoid of all mental concepts. This school of thought, most closely associated today with B. F. Skinner, views the environment as the determinant of behavior. A number of contradictory viewpoints also evolved which explicitly included beliefs and values. Kurt Lewin, who came from Germany and was familiar with the Gestalt tradition, shaped much of the work in social psychology. One central tenant of his Field Theory was that only present events influence behavior and that this influence was characterized by valences and subjective probabilities. Valences stood for the attractiveness of various goal states, and the subjective probabilities referred to the possibility of achieving a specific goal. The generalization of these concepts to values and beliefs is obvious.

Other more experimental psychologists, such as Tolman or Brunswik, also postulated cognitive concepts that closely corresponded to beliefs and values. Tolman spoke of the "expectancy" that a particular behavior might lead to particular environmental consequences, and Brunswik discussed "probabilism," a concept that dealt with "What-leads-to-what" in the environment. The groundwork had been laid for a more integrated and perhaps pervasive utilization of these ideas. All that needed to be done was for someone to explicitly describe a testable model using the belief and value components.

#### The Expected Value Model

The rule which underlies most of these approaches which we will discuss is called the expected value rule. Stated most simply, the expected value of any action can be found by summing the value of all the possible outcomes, each weighted by the probability of the outcome's occurrence. The probabilities for all the outcomes must sum to 1.00 and the equation is diagrammed

below:

$$EV = \sum_{i=1}^N \psi_i V_i \quad \sum_{i=1}^N \psi_i = 1$$

where  $\psi_i$  is the probability that outcome  $i$  will occur,  $V_i$  is the value (utility) of the  $i^{th}$  outcome, and  $N$  is the number of outcomes for the decision alternative. The overall decision rule is one which suggests that the individual desires to maximize payoffs and will, therefore, choose the alternative with the highest expected value.

Let's take an example. Suppose you are told by your insurance agent that a certain automobile policy is available which will pay you 75% of the value of your \$4,000 car in case it is stolen. The cost of the insurance is only \$25.00 a year. However, you know that the chances are only about one in one hundred that someone will steal your car. Should you buy it? The payoff matrix is presented below:

	Stolen	Not Stolen
Buy	-1,025	-25
Don't Buy	-4,000	0

If the car is stolen and you have the insurance you lose your \$4,000 plus your \$25.00 premium but you are paid \$3,000 by the insurance company. If you buy it and nothing happens you've lost \$25.00. If you don't buy the insurance and the car is stolen, you lose \$4,000 and, of course, if you don't buy it and nothing happens you neither gain nor lose.

The choice between the two alternatives is obviously dependent upon the chance that the car will be stolen. If it is very likely to be stolen you would, of course, want the insurance. If it is unlikely, you might not. But we already know these probabilities, so let's use them in our equation to

determine the proper choice.

$$ev_{buy} = (.01) (-1,025) + (.99) (-25) = -\$35.00$$

$$ev_{don't\ buy} = (.01) (-4,000) + (.99) (0) = -\$40.00$$

In this particular case you should buy the insurance. Your expected loss is less if you purchase than if you do not.

It would probably be helpful to discuss the properties of the expected value rule in more detail. First, the rule is a normative one. That is, it supposedly tells you how to acquire more or lose less in the long run. It is a rule for how you ought to behave. Thus, over a long period of years (some of which may be occasioned by the pilfering of your automobile), you would be wise to buy the insurance.

A second aspect of the rule is its simplicity and reasonableness. It may not be a completely accurate representation of your perceptions or your cognitive processes, but the evidence suggests it does fairly well in predicting behavior. Thus, not only does it reflect what you should do, it also is a fairly good description of how one actually decides to do one thing or another.

But there are some complexities as well. Certain assumptions are built into the rule. Supposedly, if you prefer outcome A to B and B to C you will prefer A to C. This sounds reasonable but whether it is true or not is an empirical question. Several studies have found that this transitivity assumption does not always hold in real choice situations. The rule also assumes that beliefs and values are independent of one another; that is, the likelihood of an outcome does not influence its value. This assumption is even more questionable than the transitivity assumption. Scheibe, for example

argues that the independence of beliefs and values depends upon the level of information available to the individual. For high information levels when the individual is required to express his beliefs, ". . . it is unlikely that demands for expression will force a person toward optimistic errors of belief . . ." (p. 108). However, when information is lacking or irrelevant, ". . . resultant beliefs are likely to be strongly related to values." (p. 108). He also contends that this independence depends upon how correctly the person perceives his degree of control over future events, and whether or not he is given full liberty in expressing his predictions.

Finally, the idea that beliefs and values combine multiplicatively and then are summed to give an overall estimate of expected value depicts a fairly complex cognitive process. Whether or not the model accurately portrays how people think will be described later.

Underlying all of these assumptions is the maximization principle. Other authors have argued that rather than maximize gain some people attempt to minimize the maximum possible loss (von Neumann and Morgenstern, 1947). Others have assumed that the individual will choose the first minimally acceptable choice. In any case, beliefs and values are directly integrated into each approach, and the following steps in the choice process seem appropriate (see Scheibe, 1970).

1. Identify the available choice alternatives (only those that are psychologically salient).
2. Identify the possible consequences of each alternative. The number of possible consequences is two--only in the simplest cases. It is usually more.

3. Determine objectively the likelihood of occurrence associated with each distinguishable outcome. Represent this as a probability between zero and one.
4. Determine the objective value of each conceivable outcome.
5. Determine the expected value for each behavior alternative (after the manner illustrated in the insurance problem).
6. Predict that the person will direct his behavior toward the outcome having the highest expected value.

There are now a number of articles and books which show the breadth of application of the expected value idea for combining beliefs and values (Scheibe, 1970; Mitchell and Biglan, 1971; Lawler, 1971). The next section of this paper discusses the various models built on expected value ideas that are important for understanding organizational behavior.

#### Examples of Expected Value Applied to Organizational Behavior

Theories are frequently used for many purposes depending upon the goals of the researcher or the practitioner. In the case of expected value, most of the research has used the idea as an explanation of behavior rather than as a guide for action. Consequently, most of the theoretical modifications of the expected value rule have been studied in the context of their ability to predict some specific organizational behavior. Most of the research we will review reflects this bias. However, a number of practical conclusions and implications for action will appear throughout the discussion, and we will summarize these suggestions in the concluding section of the paper.

#### I. Decision Theory

The fundamental principle in decision theory, the principle of maximization of expectation, was first formally stated by Pascal in 1669. However,

it has been only recently that psychologists have attempted to use it as a model for behavior (Edwards, 1954, 1961). Simply stated, the expectation for any action is found by summing the values of each of the possible outcomes of that action, each value weighted by the probability of the outcome occurring should the action be performed. The maximization principle prescribes that the action that is selected for performance be the one with the maximum expectation.

When actuarial probabilities and market values are used to calculate expectations, the term maximization of expected value (EV) is used. We discussed this model in the previous section. When subjective probabilities and subjective values (utilities) are used, the term is maximization of subjective expected utility (SEU). The former, EV, is normative in that following its prescriptions will, in the long run, yield the greatest possible record of gain. The latter, SEU, is an attempt to make the normative model descriptive by substituting subjective components for the "objective" ones. The move to a descriptive model is necessitated by abundant evidence that actuarial and subjective probabilities and market value and utility frequently are not the same (Edwards, 1954, 1961). Therefore, in what follows, we shall deal only with SEU.

The SEU for a possible course of action is:

$$\text{SEU}_x = \sum_{i=1}^n (\psi_i U_i + \bar{\psi}_i \bar{U}_i),$$

where

$\psi_i$  = the probability that outcome  $i$  will occur if action  $x$  were selected,

$U_i$  = the utility of receiving outcome  $i$ ,

$\bar{\psi}_i$  = the probability of outcome  $i$  not occurring if action  $x$  were selected,  $\psi_i + \bar{\psi}_i = 1.00$ ,

$\bar{U}_i$  = the utility of not receiving outcome  $i$  (it usually is a negative number). When  $U + \bar{U} = 0$ , the utilities are said to be symmetric.

That is, the SEU for action  $x$  is the sum over all outcomes,  $i = 1$  to  $n$ , of the expected utility ( $\psi_i U_i$ ) plus the negative expected utility ( $\bar{\psi}_i \bar{U}_i$ ) associated with each outcome. The SEUs for all possible actions are compared, and, following the maximization principle, the action with the maximum SEU is the prescribed choice.

The SEU formulation is applicable to the case where both the likelihood of an event occurring and its value are determined subjectively rather than objectively. A moment's reflection should suggest that this model is a far better representation than the EV model of most of the decisions that occur in organizations. Consider an individual trying to decide whether to go to work or not. He tries to estimate whether there is something important to do or whether his boss will be mad at him for not showing up. The value of these outcomes would be difficult to determine objectively as would the probabilities. Clearly, it is the subjective estimates of these parameters that should be most important for predicting one's course of action. The SEU model incorporates these ideas, suggests how they should be combined and predicts which action will be chosen.

A complete discussion of the research testing SEU models is available elsewhere (e.g., see Edwards, 1954, 1961; Becker and McClintock, 1967; Lee, 1971). The research initially focused on some rather simple decision tasks, such as gambles, auctions or risks. More complex, interactive settings such as the "prisoners dilemma" and exchange situations have also been used. More

recently, some of the research has focused on dyadic conflict (Atthowe, 1960), coalition formation (Ofshe and Ofshe, 1970), social influence (Tedeschi, Schlenker, and Bonoma, 1973), and clinical assessment (Krause, 1966). The research has also pursued those situations where the probabilities and utilities change, requiring a dynamic modification of the SEU model (see Peterson and Beach, 1967 or Raiffa, 1970). Those decisions that have been studied which seem particularly relevant to organizational theorists would include the taking of risk, the choice of coalitions, and the choice of recipients of communication.

One's evaluation of the support provided by all this research is contingent upon the criterion of evaluation being used. If one simply wants to know whether SEU does a relatively good job in predicting behavior (e.g., percentage of correct predictions, variance accounted for in preferences or ratings) the answer is an overwhelming yes. If one wants to know whether people actually use the model in the prescribed way, including all of the formal mathematical assumptions built into the model, the answer is probably no (see Bonoma, 1973). The SEU model does well when compared to other theories but poorly when tested against a criterion of being an exact representation of how people make choices. While we will discuss some of its inadequacies in more detail later in the paper, suffice it to say at this point that it's the best and most generalizable model we have.

## II. Social Power

A number of authors have attempted to use expected value ideas to understand the phenomena of social influence and power. Thibaut and Kelly (1959) viewed power in terms of an exchange analysis where individual B will comply with A if he believes the gains for compliance outweigh the costs and/or are

greater than the gains for any viable alternative action. Emerson (1962) also couched his theory of power in terms of dependencies of A on B and B on A. These dependencies were again based on a cost-gain type of analysis.

More recently, the expected value idea has been directly incorporated into theories of influence (Tedeschi, 1970) and social power (Pollard and Mitchell, 1972). The concept of subjective expected utility (SEU) is used in this approach. As mentioned earlier, the actor's SEU for an action is found by multiplying the actor's utility for the various outcomes of the action by the probability the actor associates with their occurrence, and summing across outcomes.

The starting point for the analysis of social power is the notion of power as the ability to satisfy wants or obtain goals. If A's goal is to get B to perform some behavior, A can do this through influencing B's decision. Thus A's power over B can be examined in terms of A's effect on B's decision. We can conceptualize B's decision process in terms of the SEU model. For the purpose of this discussion, B's decision will be limited to a choice between two behaviors: compliance ( $X$ ) and noncompliance ( $\bar{X}$ ) with A. B's SEU for each of the behaviors can be determined by multiplying B's subjective probabilities that the behavior will lead to various outcomes times the utility B attaches to the outcomes. Thus,  $SEU_X$  and  $SEU_{\bar{X}}$  can be obtained.

The possible outcomes are viewed as having a number of components, some of which are determined by A and others which stem from situational factors such as other actors, the impersonal environment, intrinsic satisfactions or dissatisfactions that B experiences from performing certain types of behavior, etc. Thus B's SEUs are determined partly by A's manipulation

of the outcomes and partly by the effects of situational factors on the outcomes. Consequently, B's SEUs for the behaviors can be broken down into two parts -- one reflecting A's effects on the outcomes B anticipates experiencing and the other representing the effects of the situational (S) factors. Therefore,

$$SEU_X = SEU_{X(A)} + SEU_{X(S)} \quad [1]$$

and  $SEU_{\bar{X}} = SEU_{\bar{X}(A)} + SEU_{\bar{X}(S)}$  [2]

According to the maximization assumption, B should choose the behavior with the maximum SEU. It is assumed here that

$$SEU_{\bar{X}(S)} \geq SEU_{X(S)}; \quad [3]$$

that is, in the absence of the effects of A on the outcomes, B would choose  $\bar{X}$  instead of X. If B would choose X to begin with, there would be no need for A to try to influence B.

Whether or not B will perform X can be determined by comparing B's SEU for X with B's SEU for  $\bar{X}$ . If B is to perform X, the difference between  $SEU_X$  and  $SEU_{\bar{X}}$  should be positive.

$$SEU_X - SEU_{\bar{X}} > 0 \quad [4]$$

In other words, B's SEU for performing X should be greater than his SEU for  $\bar{X}$ .

In attempting to influence B, A's goal is to get B to perform X and to not perform  $\bar{X}$ . Consequently, we would expect A to manipulate the outcomes that B anticipates in order to make B's  $SEU_X$  larger and B's  $SEU_{\bar{X}}$  smaller so that the difference in Expression 4 would be positive and B would perform X. Thus, a measure of the effect that A has on B's choice between X and  $\bar{X}$  is the extent to which A contributes to the difference between  $SEU_X$  and  $SEU_{\bar{X}}$ :

$$SEU_X(A) - SEU_{\bar{X}}(A) \quad [5]$$

This term represents what we call A's realized power over B. It is the force exerted by A on B to perform X and not to perform  $\bar{X}$ .

Whether or not B will actually decide to perform X is, as was discussed above, a function of Expression 4. If we substitute Equations 1 and 2 in Expression 4 and rearrange, we get:

$$(SEU_X(A) - SEU_{\bar{X}}(A)) + (SEU_X(S) - SEU_{\bar{X}}(S)) > 0 \quad [6]$$

The first term represents A's realized power over B while the second term represents the effects of situational factors. The combination of the two terms determines whether or not A will actually obtain compliance from B and represents what we call A's effective power over B. Thus, the theory can predict what decision B will make as well as the relative contribution of A and situational factors. A more detailed description of this analysis and these theoretical terms is presented in Pollard and Mitchell (1972).

This analysis is not inconsistent with other theories of power since they all suggest that A's power over B is based on A's ability to affect B's need satisfaction or provide rewards or punishment contingent upon B's compliance or non-compliance. However, this analysis does offer some advantages:

(1) It explicitly incorporates the subjective probability variable in the analysis of social power. This variable is often overlooked, yet our analysis suggests that it is important for predicting behavior in power relations.

(2) It isolates the effects of situational factors as a separate variable. The effects of situational factors are not clearly conceptualized in the various theories of power. It is argued here that these factors need to be taken into account in explaining behavior in power relationships.

(3) It provides a basis for making specific testable predictions regarding social power. As Schopler (1971) points out, "The major theoretical analyses of power typically have little data uniquely related to them, nor have they generated anything like a distinctive and coherent set of testable issues. The empirical research, on the other hand, although often acknowledging a particular theoretical parentage, is ordinarily tied to that systematic position in a tenuous manner." (p. 179). Measurement techniques exist for quantifying the major variables in the decision theory analysis, and the theory provides a detailed statement of how these variables should be combined to predict behavior.

We have some empirical data which supports this approach (Pollard, Mitchell and Beach, 1974). A group of subjects engaged in a number of decision making simulations in which they had to choose between compliance with another person or the pressure from outside environmental factors. The theory predicted correctly 170 of the 200 choices that were made, and the subject's rating of the power of the other person correlated .70 with the mathematical estimate of A's power generated by the theory. These results are fairly strong and currently represent one of the few attempts to integrate theoretical and empirical work done in the area of social power.

### III. Expectancy Theory

The most popular generalization of the expected value model to other organizational activities is called expectancy theory. Building on some earlier work of Georgopoulos, Mahoney and Jones (1957), Vroom (1964) made the first explicit theoretical formulations using expectancy notions to predict a variety of organizational behaviors. The theory has recently been described as "perhaps the most widely accepted theory of work and motivation

among today's industrial and organizational psychologists [Wahba and House, 1974, p. 121]."

Vroom (1964) presented two models, the first for the prediction of the valences of outcomes, and the second for the prediction of force toward behavior. An outcome is simply anything an individual might want to attain. The valence of an outcome for a person is defined conceptually as the strength of his positive or negative affective orientation toward it. Similar to Lewin's use of the term, valence refers to the anticipated satisfaction associated with an outcome, and is distinguished from the value of the outcome--the actual satisfaction resulting from attainment of the outcome.

The valence model states that the valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and the person's conceptions of the specific outcome's instrumentality for the attainment of these other outcomes. Symbolically,

$$V_j = f \sum_{k=1}^n (V_k I_{jk}),$$

where,

$V_j$  = the valence of outcome  $j$ ;

$I_{jk}$  = the cognized instrumentality of outcome  $j$  for the attainment of outcome  $k$ ;

$V_k$  = the valence of outcome  $k$ ;

$n$  = the number of outcomes.

Cognized or perceived instrumentality is defined conceptually by Vroom as the degree to which the person sees the outcome in question as leading to the attainment of other outcomes. Instrumentality varies from minus one (meaning that the outcome in question is perceived as always not leading to

the attainment of the second outcome) to plus one (meaning that the outcome is perceived as always leading to the attainment of the second outcome).

Although this model can be used to predict the valence of any outcome, it has been applied most frequently to the prediction of job satisfaction, occupational preference, or the valence of good performance. In essence, the model says that the worker's satisfaction with a job or anticipated satisfaction with an occupation results from the instrumentality of the job for attaining other outcomes and the valence of those outcomes. We will refer to this model as the valence model.

Vroom's second model predicted the force toward behavior. The force on a person to perform an act is conceptualized by Vroom as a monotonically increasing function of the algebraic sum of the products of the valences of all outcomes, and the strength of the person's expectancies that the act will be followed by the attainment of these outcomes (Vroom, 1964). Symbolically,

$$F_i = \sum_{j=1}^n (E_{ij} V_j),$$

where

$F_i$  = the force on the individual to perform act  $i$ ;

$E_{ij}$  = the strength of the expectancy that act  $i$  will be followed by outcome  $j$ ;

$V_j$  = the valence of outcome  $j$ ;

$n$  = the number of outcomes.

The individual's expectancy is defined by Vroom as his belief concerning the probability that the behavior in question will be followed by the outcome of interest. An expectancy is a perceived probability and, therefore, ranges from zero to plus one. It is distinguished from instrumentality in that it is an action-outcome association, while instrumentality is an outcome-outcome

association. While expectancies are perceived probabilities, instrumentalities are perceived correlations.

Vroom suggested that this force model can be used to predict choice of occupation, remaining on the job, and effort. We refer to this model as the behavioral choice model and its most frequently tested example as the job effort model. Specifically, Vroom stated that the force on the individual to exert a given amount of effort is a function of the algebraic sum of the products of the person's expectation that the given level of effort will lead to various outcomes and the valence of those outcomes. The subject should choose that effort level with the greatest force.

A number of modifications in the model have occurred over the last 10 years (see Mitchell, 1974, for a review), but they have changed the basic formulation only slightly. In general, the model has been tested in the following manner. Each subject indicates the degree to which working hard (an effort level) is seen as leading to good performance (a performance level). The subject also indicates the degree to which good performance is likely to lead to each of a set of organizational outcomes (e.g., wages, promotions, security). Finally, he estimates the valence for each outcome. These variables are combined in the prescribed manner to generate a single  $E(\Sigma IV)$  score for each subject and these scores are then correlated across subjects with some criterion variable, usually self, peer, or supervisor ratings of effort or performance. Thus, the valence of performance ( $\Sigma IV$ ) is combined with an expectancy to predict the force on the individual to work hard.

In most cases the valence model has been used to predict job satisfaction, and the choice model has been used to predict job effort. Reviews of the empirical studies using these models for these criteria are available in

the literature (Mitchell and Biglan, 1971; Heneman and Schwab, 1972; Mitchell, 1974). As a summary, the data show the average correlation using the valence model to be around .45 with job satisfaction and using the choice model around .30 with job effort (Mitchell, 1974). The data for occupational preference and choice is more impressive with the average correlation being about .65 (Mitchell and Beach, in press).

The general perspective after more than ten years of research is that expectancy models have been helpful in a variety of ways. First, they make rather explicit the idea that employees will work harder when rewards are directly tied to good performance and when good performance is contingent upon working hard on the job. Second, they make clear the distinction between job satisfaction and job effort. One may be satisfied with their job and yet have very low motivation to work hard. Finally, they point out that not all rewards will be equally attractive to all employees. Different people will work for different things. We will elaborate on these ideas later in the paper.

#### IV. Leadership

A modified expectancy theory has been applied to the area of leadership and is described as the "Path-Goal" approach (House, 1971; Evans, 1970, 1974; House and Mitchell, 1974). According to this theory, leaders are effective because of their impact on subordinates' motivation, ability to perform effectively and satisfactions. The theory is called Path-Goal because its major concern is how the leader influences the subordinates' perceptions of their work goals, personal goals and paths to goal attainment. The theory suggests that a leader's behavior is motivating or satisfying to the degree that the behavior increases subordinate goal attainment and clarifies the paths to these goals.

The initial theoretical work by Evans (1970) asserts that leaders will be effective by making rewards available to subordinates and by making these rewards contingent on the subordinate's accomplishment of specific goals. Evans argued that one of the strategic functions of the leader is to clarify for subordinates the kind of behavior that leads to goal accomplishment and valued rewards. This function might be referred to as path clarification. Evans also argued that the leader increases the rewards available to subordinates by being supportive toward subordinates, i.e., by being concerned about their status, welfare and comfort. Leader supportiveness is in itself a reward that the leader has at his or her disposal, and the judicious use of this reward increases the motivation of subordinates.

Evans (1970, 1974) analyzed the relationship between the behavior of leaders and the subordinates' expectations that effort leads to rewards and also studied the resulting impact on ratings of the subordinates' performance. He found that when subordinates viewed leaders as being supportive (considerate of their needs) and when these superiors provided directions and guidance to the subordinates, there was a positive relationship between leader behavior and subordinates' performance ratings.

However, leader behavior was only related to subordinates' performance when the leader's behavior also was related to the subordinates' expectations that their effort would result in desired rewards. Thus, Evans' findings suggest that the major impact of a leader on the performance of subordinates is clarifying the path to desired rewards and making such rewards contingent on effective performance.

Stimulated by this line of reasoning, House (1971), and House and Dessler (1974) advanced a more complex theory of the effects of leader

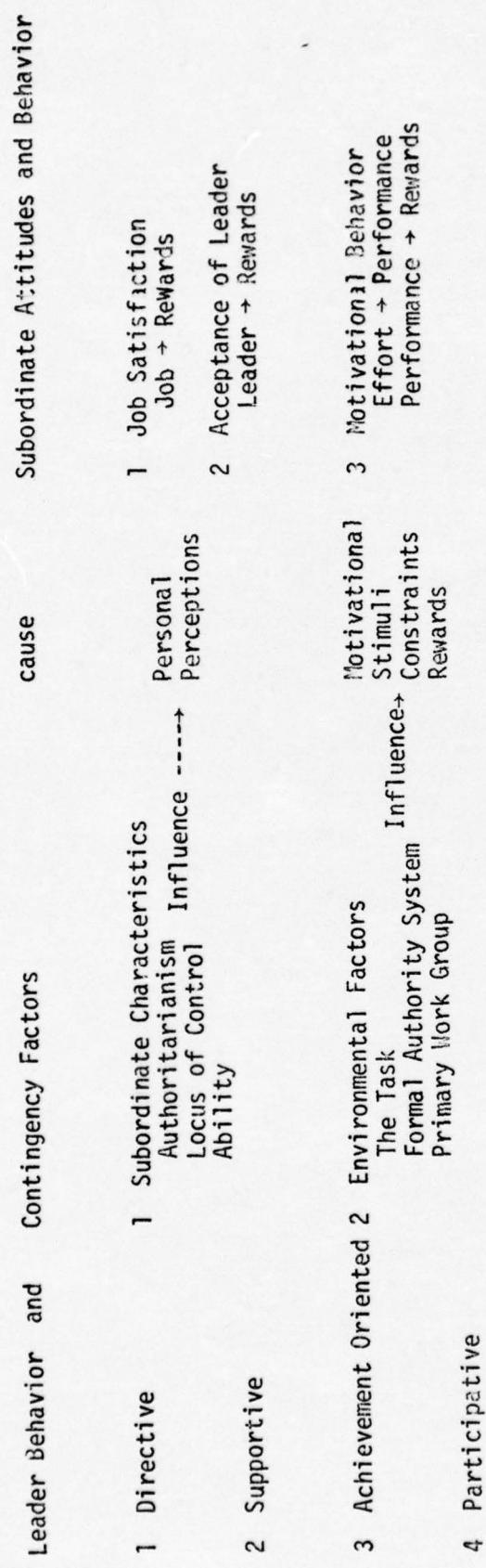
behavior on the motivation of subordinates. The theory intends to explain the effects of four specific kinds of leader behavior on the following three subordinate attitudes or expectations: (1) the satisfaction of subordinates, (2) the subordinates' acceptance of the leader and (3) the expectations of subordinates that effort will result in effective performance and that effective performance is the path to rewards. The four kinds of leader behavior included in the theory are: (1) directive leadership, (2) supportive leadership, (3) participative leadership and (4) achievement-oriented leadership. A description and definition of those styles is presented in House and Mitchell (1974).

Besides the direct effect of the four leadership styles on the three subordinate attitudes or expectations, there are a number of postulated moderator or contingency variables. More specifically, House and Mitchell (1974) suggest that any relationship between leadership style and subordinate attitudes will be partially dependent upon (1) the personal characteristics of the subordinate and (2) the environmental pressures and demands with which the subordinate must cope. All of this information is combined in Figure 1.

Insert Figure 1 about here

There is now a fairly substantial amount of data that supports some of the propositions of this theory (see House and Mitchell, 1974, for a review). The most support has come for the ideas that structuring leader behavior is best in an unstructured situation and considerate behavior is best in a structured situation. More recent papers by Sims and Szilagy (1975), Stinson and Johnson (1975) and Downey, Sheridan and Slocum (1975) have also

**Figure 1**  
**Summary of Path-Goal Relationships**



found some support (and some lack of support) for some of the specific predictions made by the theory. However, in a relatively short time (5 years) the Path-Goal approach to leadership has become one of the most important competing alternative explanations of leadership effectiveness.

#### V. Attitudes

Organizational participants have been having their attitudes assessed for as long as there have been people interested in doing empirical research on organizational behavior. There have been studies on alienation, consumer attitudes, job satisfaction, and attitudes towards supervision, compensation and working conditions. The central focus of the attitude research is twofold: (1) what makes up an attitude, that is how is it theoretically conceptualized and (2) how are attitudes related to behavior.

One of the most currently popular attitude theories is based directly on an expected value type formulation. It was developed by Fishbein (1967, 1973) and is expressed in the following way:

$$B \sim BI = \left[ \sum_{i=1}^n B_i a_i \right] W_1 + \left[ \sum_{i=1}^m NB_i Mc_i \right] W_2, \quad (1)$$

where  $B$  = overt behavior,  $BI$  = the behavioral intention to perform that behavior,  $B_i$  = the belief (perceived probability) that performing the behavior will lead to some consequences  $X_i$ ,  $a_i$  = the evaluation of  $X_i$ ,  $NB_i$  = the perceived expectations of referent  $i$ ,  $Mc_i$  = the motivation to comply with referent  $i$ , and  $W_1$  and  $W_2$  = empirically determined regression weights. The first component of the model ( $\sum B_i a_i$ ) is actually an estimate of attitude. In this case attitude is seen as the belief that a particular behavior will lead to an outcome weighted by the evaluation of the outcome. Fishbein describes this term as the "attitude toward the act" and has presented

substantial evidence that it is a valid theoretical conceptualization. When measures of  $B_i a_i$  are correlated with more traditional attitude measures, Fishbein reports correlations in the .80's (Fishbein, 1963, 1967).

But the second issue, the relationship between attitude and behavior is also important. Essentially, Fishbein is arguing that any act is predictable from one's intention and that this intention is in turn predictable from the individual's attitude toward the act ( $\Sigma B_i a_i$ ) and the normative pressure to perform the act ( $\Sigma NB_i Mc_i$ ).

In a recent paper Ajzen and Fishbein (1973) review the empirical support for the theory. An average of the correlations across a set of studies for predicting behavioral intention was .77. The average correlation between intention and behavior was .65. These results are fairly impressive and cover a number of behaviors of organizational relevance such as cooperative behavior, choice of person to communicate with, amount of risk and compliance.

The major implications of using this type of model are somewhat different from more traditional attitude theories. First, there is a distinct conceptual difference between one's attitude in general and one's attitude towards a specific act. It is only this latter concept that is highly related to behavior. Second, a SEU type formulation is used as a definition of attitude. Besides the early work of Peak (1955) and Rosenberg (1959), few researchers have explicitly used these ideas as a definition of attitude. Finally, the theory suggests that the attitude-behavior relationship is highly situationally determined. One must know the circumstances under which the act is to be performed and the social norms that exist in this setting. All of these suggestions were important contributions to our ability to use attitudes to predict behavior.

Criticisms

So far, we've painted a fairly rosy picture. Expected value models seem to be taking over the field. However, not everyone is so enthusiastic, and a review of their reservations is required. We will discuss some criticisms of both the expected value and expectancy type models.

Conceptual and Methodological Problems: SEU

One of the issues of concern in Behavioral Decision research has been whether it is reasonable to assume that subjective probabilities are congruent with the dictates of probability theory. This is a very strong assumption, requiring as it does a mathematical precision in subjective probabilities that seems unlikely to exist. Of course, it is possible to adopt a more tolerant criterion and ask if there is sufficient similarity to justify the use of SEU as a descriptive model. But, even with this criterion, the experimental evidence is not decisive; for simple, familiar events there is evidence suggesting that the congruence may be good enough for most real-life intuitive decision making (Barclay and Beach, 1972, Beach and Peterson, 1966; Peterson, Ulehla, Miller, Bourne and Stilson, 1965). Other investigators strongly disagree with this conclusion, however (Tversky and Khanaman, 1974; Slovic and Lichtenstein, 1971), and the question is far from settled. On the other hand, Edwards (1954) has questioned whether it is a necessity for such congruence to exist in order to use the SEU model as a descriptive model--the congruence is desirable primarily because without it it can be shown that a person would be willing to engage in totally irrational decision practices. Of course, we know that people often engage in irrationality, so it may be appropriate to reflect such conditions in the descriptive model. This view has not received very much attention recently, but perhaps it deserves further consideration.

In addition to the congruence question there also is a question about how subjective probabilities should be measured. Many studies have taken a direct approach and asked subjects for straightforward verbal assessments. These are made either on scales that are labeled from .00 to 1.00 or by dividing 100 markers into stacks or by stating odds or the like (e.g., Peterson, Schneider and Miller, 1964; Beach, 1968, Phillips, Hays and Edwards, 1966). Other studies have used indirect measurement methods; the two most common methods involve inferring subjective probabilities from bets (e.g., Preston and Baratta, 1948) or from scoring rules (Murphrey and Winkler, 1970). There seems to be an assumption on the part of some investigators that the indirect methods are somehow more pure, more scientific. But, in the only two studies that have attempted careful comparisons between individual subjects' subjective probabilities from bets and from verbal assessments for the same events, fairly high agreement has been found (DuCharme and Donnell, 1973; Beach, 1974).

A third question is about whether utilities are additive. The computation of SEU involves the summing of weighted utilities, where the weights are subjective probabilities. The two major studies that examined additivity most extensively are in conflict: Tversky (1967) found that 32 of the 33 cases he examined evidence additivity while Anderson and Shanteau (1970) and Shanteau (1974) found that the subjects added, but not perfectly. The answer to this question is obviously unresolved.

There have also been criticisms of a more general nature. Some authors have simply argued that once a single instance or choice situation is shown to be under the control of some other model, then the SEU model loses its claim as a general model of how people choose to behave. Kogan and Wallach (1967), for example, review a number of settings where SEU models seem

particularly inappropriate. It has also been pointed out that the major inadequacy of the model is that it fails to account for the general instability of human choices and environmental circumstances. So, the formal assumptions, the operational methodology, and the underlying general premises have only received moderate support.

Overall, these evaluations leave things rather unsettled. But the tentative inclination on the part of researchers who are interested in applying SEU seems to be somewhat cavalier--assume subjective probabilities are reasonably congruent with probability theory, use direct verbal methods to measure them (and utilities), assume that utilities are additive, and if it works, use it and do not get too caught up in the subtleties. The experimental studies suggest this can be done and still produce impressive results.

#### Conceptual and Methodological Problems: Expectancy Theory

While detailed reviews of the inadequacies of expectancy theory can be found elsewhere (Mitchell, 1974), it seems pertinent to at least touch on a number of major concerns. First, it is not clear how an investigator should ascertain what outcomes would be most relevant for a particular employee or job candidate. Obviously, when salient outcomes are omitted, the predictability of the model is limited. Just asking employees or job candidates is inadequate because their knowledge may be limited or inaccurate. On the other hand, if the researcher uses some standard list of outcomes mentioned by a large number of people previously tested he runs the risk of omitting an important outcome for a particular person. There has been little agreement about the resolution of this problem.

A second set of problems focuses on the measures of the theoretical components. In many cases instrumentalities are treated as expectancies or

expectancies are measured as if they were instrumentalities. The valence measures sometimes reflect importance and at other times affect. Clarification and standardization in this area are sorely needed.

Finally, a number of mathematical and theoretical assumptions built into the model are largely untested. Since the scales used to measure the theoretical components are ordinal at best, they can not truly be used to reflect an underlying multiplicative relationship (Schmidt, 1973). Inferences about the underlying psychological properties are therefore inappropriate.

A related issue involves the manner in which the theory has been tested. In many cases a preference or choice score for one occupation (e.g., going into business) is generated for each individual in a group of subjects, and these scores are correlated with some other, independently gathered criteria such as an attitude measure. Thus, each subject has a  $\Sigma IV$  score and an attitude score for one occupation, and these two scores are correlated over a large sample to see if positive preferences ( $\Sigma IV$ ) are related to positive attitudes.

This practice runs counter to the original theoretical formulations made by Vroom. He specifically stated that preference and choice were within-subject, relative processes. One must examine a specific individual's  $\Sigma IV$ 's for a set of occupations and relate these scores to some independent rating or ordering of these occupations. The same would be true for the occupational choice model. Thus, while Vroom saw expectancy theory as an individual decision-like approach, its use in practice has often deviated from this conceptualization.

Where does this leave us? It is obvious that expected value and expectancy models are being used to explain a large number of behaviors in

organizational settings. The research results suggest that these types of models do fairly well in predicting behavior but fall short of being highly accurate assessments of how people actually think. Why, then, have we not moved on to different approaches?

The answer seems to be that while SEU type models are not completely accurate, they are overwhelmingly intuitively compelling. Bonoma (1973), in his excellent review, stated it this way:

"It is our belief that this incongruence between evidence and recommendation, between content and summary, is due neither to any serious perceptual aberrations of previous analysts, nor to any unwillingness to abandon SEU notions per se. Rather, we believe that those who examine SEU-like models, and I am certainly no exception, are simply quite taken with the highly compelling nature of the SEU-like conceptualization of choice behavior. To put it atheoretically and definitely unscientifically, it simply "feels intuitively right" that we as well as others engage in a process similar to SEU evaluation and maximization in a large part of our everyday decisions." (p. 30).

In the next section we discuss how these ideas are generalizable to issues of organizational design.

#### Implications for Organizational Design

An overview of what we've presented is fairly broad in its scope. Expected value models or variants of them have been supported as predictors of job satisfaction, occupational choice, decision making, social power, effort on the job, job attitudes, risk taking in groups and leadership

effectiveness. Obviously, a lot of researchers and theorists believe that such a position makes sense (the criticisms notwithstanding).

But, as we mentioned earlier, the support for theoretical notions is distinct from their applications. In this concluding section, we will discuss some possibilities for implementing expected value ideas in the design of organizations.

First, there are some general summary statements that can be inferred from this approach:

1. Behavior is based on individual beliefs and values. The expected value model is essentially an individualistic model; each person will value and expect different things. The implication for design is that the greater the flexibility in rules, regulations, reward structures, decision structures and compensation systems, the more likely it is that individuals will be able to behave in a fashion that maximizes their expected return. If every decision must be made a certain way; if every employee receives the same reward; if every leader is trained to behave the same way; then the organization to run effectively will need to have all its employees be highly homogeneous. Obviously, the point is a relative one. But within limits, increased flexibility should lead to a more effective organization.

2. Behavior is based on conscious choice and is modifiable. The heart of this theory implies that behavior is volitionally controlled. People figure out what they want and then pursue it. Thus, organizations can influence behavior through their systems of rewards, contingencies and the frequency and consistency with which they are administered. This idea is in direct conflict with theoretical alternatives which suggest that people are controlled by unconscious desires, instinctual urges or by the environment.

3. The knowledge of the relationship between behaviors and outcomes is crucial for effective choice behavior. The more frequently and consistently feedback is given or received, the easier it is for the individual to base his choices on accurate information. Through various training and administrative procedures, feedback of this type may be implemented in numerous areas of organizational interest.

To get down to specifics requires some inferential leaps that are somewhat speculative. The thrust of the research efforts to date have been on validating the theory, not on the implications for practice. However, a number of suggestions seem pertinent. All we ask is that the reader realize that other theories besides expected value approaches might make similar suggestions.

1. Motivation. One of the major implications of an expectancy model of motivation is that more organizational flexibility and individual choice will increase effort on the job. Some specifics with regard to these suggestions are currently being implemented. Some researchers have discussed the use of "cafeteria style" compensation systems (Lawler, 1971; Sandler, 1974) where the individual has an input in determining how a total compensation package will be divided into various categories like salary, days off, sick leave, insurance, retirement, stock options, etc. For example, one employee might prefer less money but more time off while another employee would prefer an opposite allocation of compensation. The idea is, of course, that highly valent outcomes can be made available for everyone.

A second idea which provides more individual choice is the idea of flexitime. All employees are required to be at the work place during some "core hours", let's say 10:00 a.m. to 2:00 p.m. But the other four hours

can be put in according to the individual employee's wishes. For example, one employee may work from 9:30 to 5:30 while another would prefer a 7:00 to 3:00 schedule. This flexibility allows the individual to pursue other outside activities that he enjoys (e.g., fishing, sleeping, afternoon sunbathing) without having the job be a terribly disruptive factor. While neither the "cafeteria" compensation plan or flexitime have been adopted on a large scale in industry, there is some evidence that they may be effective (Sandler, 1974).

Finally, within some practical confines, it seems logical that the more explicit the feedback and the more regularly and consistently it is given the higher the motivation. While behaviorism and expectancy approaches have diametrically opposite explanations of what causes behavior (i.e., the environment versus cognitions) they both agree that introducing specific schedules of reinforcement (timing and amount of reward is specified exactly) will increase motivation. Using such schedules helps the employee know what sorts of behaviors and activities will be rewarded and which ones will not. Again, there is positive evidence for such an approach (Yukl and Latham, 1975).

2. Leadership. The central theme of the Path-Goal approach is that leadership effectiveness is dependent upon the proper match between the leader's behavior, the situation and the needs of one's subordinates. This idea relates directly to selection, training and evaluation policies within the organization. From a selection perspective one would advocate increased use of assessment centers (Howard, 1974), and other approaches which attempt to have job candidates participate in activities that simulate actual on-the-job settings. With a thorough job analysis and data about how candidates actually behave in similar circumstances, the right person for the job may be more easily identified.

Once someone is on the job in a leadership role, the critical aspects of his behavior from a Path-Goal perspective are how clearly he establishes contingencies and feedback and his ability to provide the proper rewards and punishments when they are appropriate. The more explicit the performance appraisal system, the easier it will be for the leader. Recently, the use of "behavioral yardsticks" has been suggested (Campbell, Dunnette, Lawler and Weick, 1970) as a means of achieving fair, explicit feedback. Behavioral incidents are used to generate a list of specific agreed upon behaviors that lead to effective performance. The role of the leader then is to assess the frequency with which these behaviors are used and provide feedback as to whether their frequency should increase and by how much. Thus, the expectancies (paths to goals) of what leads to an effective performance evaluation should be clear to subordinates.

3. Decision Making. The practical suggestions in the area of decision making depend upon whether the individual is working alone or in a group context. If he is alone, then the major practical strategies to increase effectiveness are basically technology oriented. They may consist of computer based systems which can provide information storage, retrieval, and search and analysis. Better estimates can be provided by the computer than by the human with respect to projections of future events based on partial data, the manipulation and analysis of large amounts of data and the consideration of multiple alternatives. There are also certain decision aids, such as decision trees, which help the decision maker to consider both beliefs and values and combine them in the appropriate way.

Group decision making raises a set of different issues, especially with respect to the idea of "participation in decision making." From a manager's

or leader's point of view, participation may help to generate new alternatives, better assess probabilities and values, and gain support for the chosen alternative. Vroom and Yetton (1973) have recently proposed and initially validated a model which describes under what conditions different degrees of participation are optimal.

From a subordinate's point of view, participative decision making may serve a very different function. Mitchell (1973), for example, has argued that participation can be directly tied to motivation through expectancy ideas. More specifically, participation should (a) increase expectancies by clarifying contingencies (b) increase valences through the process of people jointly deciding upon contingencies (c) increase the relationship between motivation and behavior by increasing autonomy and (d) increase the relationship between motivation and behavior by increasing commitment and social pressure. The Mitchell (1973) paper presents data from a number of studies which support these propositions.

4. Social Power. The use of a decision analysis of power relationships was more of an exercise in understanding than of practical considerations. Each organization can decide to some extent how they want power and authority to be distributed based on formal rewards and sanctions. The important element suggested by the expected value analyses was that the subordinate will comply only partly as a function of the resources controlled by a manager or supervisor. The individual weighs the consequences of compliance and non-compliance that are controlled by social, environmental and outside factors. Thus, the way to obtain the greatest compliance (and therefore, in some sense, increase the power of management) may be to increase participation! While this statement may seem paradoxical, that management

can increase power by relinquishing it, there is evidence to substantiate it (Rosner, Kavcic, Tannenbaum, Viabello and Wieser, 1972). If the additional motivational benefits occur, then participation in decision making (with certain qualifications) may turn out to be an exceptionally useful policy for organizational effectiveness.

### Conclusions

The practical implications discussed above read like a review of all the "buzz" words currently popular in the management literature. Again, we should emphasize that numerous theories might make similar predictions. But the scope of the suggestions is worth discussing. More specifically, the expected value model sees as compatible those approaches which are frequently described as mechanistic and rational (e.g., schedules of reinforcement) and those approaches which are more humanistic in nature (e.g., participation in decision making). Thus, expected value type models may be more useful in understanding a wide variety of organizational phenomena than other competing theoretical alternatives.

Also, from a practitioners point of view, the cause of the behavior may be less important than the practical implication. It may be irrelevant whether schedules of reinforcement increase performance, because behavior is caused by a rational cognitive process or solely by the environment. The person involved in organizational design may simply want to know if it works.

In summary, then, we feel that expected value models can be useful for understanding why people behave the way they do in a variety of organizational contexts; they attempt in a rough way to maximize their payoffs. The empirical support for this type of idea is fairly substantial and generally more

more supportive than for any other theoretical position. The implications for organizational design are numerous, but the focus is fairly consistent; the greater the emphasis on understanding the role of individual beliefs and values, the greater the effect on behavior.

References

- Ajzen, I. & Fishbein, M. Attitudinal and normative variables as predictors of specific behaviors. Journal of Personality and Social Psychology, 1973, 27, 41-57.
- Anderson, N. H. & Shanteau, J. C. Information integration in risky decision making. Journal of Experimental Psychology, 1970, 84, 441-451.
- Atthowe, J. M., Jr. Types of conflict and their resolution: A reinterpretation. Journal of Experimental Psychology, 1960, 59, 1-9.
- Barclay, S. & Beach, L. R. Combinatorial properties of personal probabilities. Organizational Behavior and Human Performance, 1972, 8, 176-183.
- Beach, L. R. Probability magnitudes and conservative revision of subjective probabilities. Journal of Experimental Psychology, 1968, 77, 57-63.
- Beach, L. R. A note on the intrasubject similarity of subjective probabilities obtained by estimates and by bets. Organizational Behavior and Human Performance, 1974, 11, 250-252.
- Beach, L. R. & Peterson, C. R. Subjective probabilities for unions of events. Psychonomic Science, 1966, 5, 307-308.
- Becker, G. M. & McClintock, C. G. Value: Behavioral decision theory. Annual Review of Psychology, 1967, 18, 239-286.
- Bonomo, T. V. On the social psychology of decisions under uncertainty: Cost-gain models and subjective expected utility variants. Unpublished manuscript, Institute for Juvenile Research, Chicago, 1973.
- Campbell, J. P., Dunnette, M. D., Lawler, E. E., III & Weick, K. E., Jr. Managerial Behavior, Performance and Effectiveness. New York: McGraw-Hill, 1970.

- Downey, H. K., Sheridan, J. E. & Slocum, J. W., Jr. Analysis of relationships among leader behavior, subordinate job performance and satisfaction: A path-goal approach. Academy of Management Journal, 1975, 18, 253-262.
- DuCharme, W. M. & Donnell, M. L. Intrasubject comparison of four response modes for "subjective probability" assessment. Organizational Behavior and Human Performance, 1973, 3, 108-117.
- Edwards, W. The theory of decision making. Psychological Bulletin, 1954, 51, 380-417. (Reprinted: In W. Edwards & A. Tversky, Decision Making. Baltimore: Penguin Books, 1967).
- Edwards, W. Behavioral decision theory. Annual Review of Psychology, 1961, 12, 473-498. (Reprinted: In C. W. Backman & P. F. Secord, Problems in Social Psychology. New York: McGraw-Hill, 1966).
- Emerson, R. M. Power-dependence relations. American Sociological Review, 1962, 27, 31-40. (Reprinted: In C. W. Backman & P. F. Secord, Problems in Social Psychology. New York: McGraw-Hill, 1966).
- Evans, M. G. The effects of supervisory behavior on the path-goal relationship. Organizational Behavior and Human Performance, 1970, 55, 277-298.
- Evans, M. G. Extensions of a path-goal theory of motivation. Journal of Applied Psychology, 1974, 59, 172-178.
- Fishbein, M. An investigation of the relationships between beliefs about an object and the attitude toward that object. Human Relations, 1963, 16, 233-240.
- Fishbein, M. Attitude and the prediction of behavior. In M. Fishbein (Ed.), Readings in Attitude Theory and Measurement. New York: Wiley, 1967.
- Fishbein, M. The prediction of behaviors from attitudinal variables. In C. D. Mortensen & K. K. Sereno (Eds.), Advances in Communication Research. New York: Harper & Row, 1973.

- Georgopoulos, B. S., Mahoney, G. M. & Jones, N. W. A path-goal approach to productivity. Journal of Applied Psychology, 1957, 41, 345-353.
- Heneman, H. G., III & Schwab, D. P. An evaluation of research on expectancy theory predictions of employee performance. Psychological Bulletin, 1972, 78, 1-9.
- House, R. J. A path-goal theory of leader effectiveness. Administrative Science Quarterly, 1971, 16, 321-338.
- House, R. J. & Dessler, G. The path-goal theory of leadership: Some post hoc and a priori tests. In J. G. Hunt, (Ed.), Contingency Approaches to Leadership. Carbondale, Illinois: Southern Illinois University Press, 1974.
- House, R. J. & Mitchell, T. R. Path-goal theory of leadership. Journal of Contemporary Business, 1974, Autumn, 81-97.
- Howard, A. An assessment of assessment centers. Academy of Management Journal, 1974, 17, 115-134.
- Kogan, N. & Wallach, M. A. Risk taking as a function of the situation, the person and the group. In New Directions in Psychology III. New York: Holt, 1967, 111-278.
- Krause, M. A cognitive theory of motivation for treatment. Journal of General Psychology, 1966, 72, 9-19.
- Lawler, E. E. Pay and Organizational Effectiveness: A Psychological View. New York: McGraw-Hill, 1971.
- Lee, W. L. Decision theory and human behavior. New York: Wiley, 1971.
- Mitchell, T. R. Motivation and participation: An integration. Academy of Management Journal, 1973, 16, 670-679.

- Mitchell, T. R. Expectancy models of job satisfaction, occupational preference and effort: A theoretical, methodological, and empirical appraisal. Psychological Bulletin, 1974, 81, 1053-1077.
- Mitchell, T. R. & Beach, L. R. Expectancy theory, decision theory and occupational preference and choice. In S. Schwartz and M. F. Kaplan (Eds.), Human Judgment and Decision Processes: Applied Aspects, 1976, in press.
- Mitchell, T. R. & Biglan, A. Instrumentality theories: Current uses in psychology. Psychological Bulletin, 1971, 76, 432-454.
- Murphy, A. H. & Winkler, R. L. Scoring rules in probability assessment and evaluation. Acta Psychologica, 1970, 34, 273-286.
- Ofshe, L. & Ofshe, R. Utility and Choice in Social Interaction. Englewood Cliffs, New Jersey: Prentice-Hall, 1970.
- Peak, H. Attitude and motivation. Nebraska Symposium on Motivation, 1955, 3, 149-189.
- Peterson, C. R. & Beach, L. R. Man as an intuitive statistician. Psychological Bulletin, 1967, 68, 29-46.
- Peterson, C. R., Schneider, R. J. & Miller, A. J. Sample size and the revision of subjective probabilities. Journal of Experimental Psychology, 1965, 69, 522-527.
- Peterson, C. R., Ulehla, Z. J., Miller, A. J., Borne, L. E. & Stilson, D. W. Internal consistency of subjective probabilities. Journal of Experimental Psychology, 1965, 70, 526-533.
- Phillips, L. D., Hays, W. L. & Edwards, W. Conservatism in complex probabilistic inference. IEEE Transactions on Human Factors in Electronics, 1966, HFE-7, 7-18.

- Pollard, W. E. & Mitchell, T. R. Decision theory analysis of social power. Psychological Bulletin, 1972, 78, 433-446.
- Pollard, W. E., Mitchell, T. R. & Beach, L. R. Empirical support for a decision theory view of social power. Personality and Social Psychology Bulletin, 1974, 1, 216-219.
- Preston, M. G. & Baratta, P. An experimental study of the auction value of an uncertain outcome. American Journal of Psychology, 1948, 61, 183-193.
- Raiffa, H. Decision Analysis: Introductory Lectures on Choices under Uncertainty. Reading, Massachusetts: Addison-Wesley, 1970.
- Rosenberg, M. J. Cognitive structure and attitudinal affect. Journal of Abnormal and Social Psychology, 1956, 53, 367-372.
- Rosner, M. B., Kavac, A. S., Tannenbaum, M. V. & Wieser, G. Worker participation and influence in industrial plants in five countries. Proceedings of the First International Sociological Conference on Participation and Self-Management. Derbrovink, Yugoslavia, 1973, 4, 91-102.
- Sandler, B. E. Eclecticism at work: Approaches to job design. American Psychologist, 1974, 29, 767-773.
- Scheibe, K. E. Beliefs and Values. New York: Holt, Rinehart and Winston, 1970.
- Schmidt, F. L. Implications of a measurement problem for expectancy theory research. Organizational Behavior and Human Performance, 1973, 10, 243-251.
- Schopler, J. Social power. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology. Vol. 2. New York: Academic Press, 1965.
- Shanteau, J. Component processes in risky decision making. Journal of Experimental Psychology, 1974, 103, 680-691.

- Sims, H. P., Jr. & Szilagyi, A. D. Leader structure and subordinate satisfaction for two hospital administrative levels: A path analysis approach. Journal of Applied Psychology, 1975, 60, 194-197.
- Slovic, P. & Lichtenstein, S. Comparison of Bayesian and regression approaches to the study of information processing in judgment. Organizational Behavior and Human Performance, 1971, 6, 649-744.
- Stinson, J. E. & Johnson, T. W. The path-goal theory of leadershipP A partial test and suggested refinement. Academy of Management Journal, 1975, 18, 242-252.
- Tedeschi, J. T. Threats and promises. In P. Swingle, (Ed.), The Structure of Conflict. New York: Academic Press, 1970, 155-192.
- Tedeschi, J. T., Schlenker, B. R. & Bonoma, T. V. Conflict, Power and Games: The Experimental Study of Interpersonal Interactions. Chicago: Aldine, 1973.
- Thibaut, J. & Kelley, H. H. The Social Psychology of Groups. New York: Wiley, 1959.
- Tversky, A. Additivity, utility and subjective probability. Journal of Mathematical Psychology, 1967, 4, 175-202.
- Tversky, A. & Kahneman, D. Judgment under uncertainty: Heuristics and biases. Science, 1974, 185, 1124-1131.
- von Neumann, J. & Morgenstern, O. Theory of Games and Economic Behavior. (2nd ed.) Princeton, New Jersey: Princeton University, 1947.
- Vroom, V. H. Work and Motivation. New York: Wiley, 1964.
- Vroom, V. H. & Yetton, P. W. Leadership and Decision Making. Pittsburgh: University of Pittsburgh Press, 1973.

Wahba, M. A. & House, R. J. Expectancy theory in work and motivation:  
Some logical and methodological issues. Human Relations, 1974, 27,  
121-147.

Yukl, G. A. & Latham, G. P. Consequences of reinforcement schedules and  
incentive magnitudes for employee performance: Problems encountered  
in an industrial setting. Journal of Applied Psychology, 1975, 60,  
294-298.

Footnote

<sup>1</sup>This research was partially supported by the Office of Naval Research Contract NR 170-761, N00014-67-A-0103-0032 (Terence R. Mitchell, Principal Investigator).

225-405

Technical Reports, Papers Presented at Meetings and

Working Papers Which the Contract Supported

June 1, 1973 - December 31, 1975

Technical Reports

- |        |                                                |                                                                                                                                 |
|--------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 73-43  | Mitchell, T. R. & Pollard, W. E.               | Effort, Ability, and Role Perceptions as Predictors of Job Performance                                                          |
| 73-44* | Nebeker, D. M. & Mitchell, T. R.               | Leader Behavior: An Expectancy Theory Approach                                                                                  |
| 73-47  | Vinson, E. & Mitchell, T. R.                   | Replication and Extension of Expectancy Models for Job Effort, Satisfaction and Performance                                     |
| 73-49* | Mitchell, T. R.                                | Motivation and Participation: An Integration                                                                                    |
| 73-51* | Vinson, E. & Mitchell, T. R.                   | Black and White Differences in Motivation: An Expectancy Approach                                                               |
| 73-52* | Mitchell, T. R.                                | Expectancy Model of Job Satisfaction, Occupational Preference and Effort: A Theoretical, Methodological and Empirical Appraisal |
| 74-56* | Mitchell, T. R., Smyser, C. R. & Weed, S. E.   | Locus of Control: Supervision and Work Satisfaction                                                                             |
| 74-57* | Pollard, W. E., Mitchell, T. R. & Beach, L. R. | An Empirical Examination of Social Power in Terms of Decision Theory                                                            |
| 74-60* | Weed, S. E. & Mitchell, T. R.                  | Leadership Style, Subordinate Personality, and Task Type as Predictors of Performance and Satisfaction with Supervision         |
| 75-65* | Umstot, D. D., Bell, C. E. & Mitchell, T. R.   | Effects of Job Enrichment and Task Goals on Satisfaction and Productivity: Implications for Job Design                          |
| 75-66  | Beach, B. H., Mitchell, T. R. & Beach, L. R.   | Components of Situational Favorableness and Probability of Success                                                              |
| 75-67* | House, R. & Mitchell, T. R.                    | Path Goal Theory of Leadership                                                                                                  |

- 75-75\* Mitchell, T. R. & Beach, L. R. Expectancy Theory, Decision Theory, and Occupational Preference and Choice
- 75-76 Mitchell, T. R., Larson, J. R. & Green, S. G. Leader Behavior, Situational Moderators and Group Performance: An Attributional Analysis

\*starred papers are published or in press.

Papers Read at Meetings, Some Travel Support or Research Support From Contract

Mitchell, T. R. Methodological problems with our current use of expectancy theory. Paper presented at the Western Academy of Management, Reno, Nevada, April, 1973.

\*Mitchell, T. R. Leadership style and organizational effectiveness. Paper presented at the Sixth National Leadership Development Seminar for State Directors of Vocational Education, Nashville, Tennessee, September, 1973.

Mitchell, T. R. A methodological and empirical critique of expectancy theories. Paper presented at Special Conference on VIE Theory at the Academy of Management meetings, Boston, Massachusetts, August, 1973.

Nebeker, D. M. and Mitchell, T. R. Expectancy Theory predictions of leader behavior. Paper presented at American Psychological Association, Montreal, Canada, August, 1973.

Weed, S. E., Mitchell, T. R. and Smyser, C. R. A test of House's Path-Goal Theory of Leadership in an organizational setting. Presented at the Western Regional Meetings of the American Psychological Association, San Francisco, California, April, 1974.

\*Mitchell, T. R. Motivation Theory: An attempt at integration. Presented at the NATO Conference on Work Design, York, England, August, 1974.

\*Mitchell, T. R. Cognitions and Skinner: Some questions about behavioral determinism. Presented at the Academy of Management Meetings, Seattle, Washington, August, 1974.

Pollard, W. E. and Mitchell, T. R. Empirical support for a decision theory view of social power. Presented at the American Psychological Association Meetings, New Orleans, Louisiana, September, 1974.

Vinson, E. and Mitchell, T. R. Black and white differences in motivation: An expectancy approach. Presented at the Academy of Management Meetings, New Orleans, Louisiana, August, 1975.

Weed, S. E. and Mitchell, T. R. Leadership style, subordinate personality and task type as predictors of performance and satisfaction. Presented at the American Psychological Association Meetings, Chicago, Illinois, September, 1975.

\*starred papers were not available in technical report form but have been or are about to be published.

Papers Not in Technical Report Form

- \*Mitchell, T. R., Hick, K., Bell, C. & Carter, Wm. Determinants of Interpersonal Disclosures:  
Some Competitive Tests
- Mitchell, T. R., Weed, S. E. & Smyser, C. M. Personal and Organizational Correlates of  
Expectancies and Instrumentalities
- Mitchell, T. R. Path-Goal and Contingency Model Predictions  
of Group Performance
- Mitchell, T. R. & Weed, S. E. Leader-Follower Perceptual Disagreement as  
Predictors of Motivation, Satisfaction and  
Performance

\*starred paper is published.